first half frame depressions, and a second half frame, comprising a plurality of second half frame depressions connectable to the plurality of first half frame depressions to form the plurality of permeate or sweep flow slots in the support frame.

3. The membrane device of claim **1**, wherein the feed slots and the permeate or sweep flow slots are configured to transport selected fluids or molecules through the membrane device at a 90 degree relative orientation for a cross-current flow pattern or at a 180 degree orientation for a counter-current flow pattern during operation.

4. The membrane device of claim **1**, wherein the porous metal membranes are disposed a selected distance apart on the support frame.

5. The membrane device of claim **1**, wherein the porous metal membranes comprise a symmetric porous metal membrane.

6. The membrane device of claim **1**, wherein the porous metal membranes include pores of a size between about 0.010 μm and about 10 μm and a thickness selected between about 20 μm and about 200 μm.

7. The membrane device of claim **1**, wherein the porous metal membranes include a porous backing material comprising pores having a pore opening of from about 0.01 mm to about 5 mm.

8. The membrane device of claim **7**, wherein the porous backing material comprises flow channels having a hydraulic diameter of about 0.3 mm to about 3.0 mm.

9. The membrane device of claim **1**, wherein the feed slots and/or permeate slots define openings with a height dimension selected between about 0.5 mm and about 5.0 mm.

10. The membrane device of claim **1**, wherein at least one of the porous metal membranes in the membrane cassettes includes a zeolite membrane comprising a selected zeolite in a layer of a selected thickness thereon deposited on a porous metal support sheet, the zeolite membrane is structured to remove a selected molecule from a feed stream introduced into the membrane device under a pressure gradient that yields a permeate stream concentrated with the selected molecule.

11. The membrane device of claim **10**, wherein the zeolite membrane is a water-selective membrane with pores selective to permeation of water molecules that provide a water permeance greater than or equal to about 1E-06 $Mol/m^2/Pa/s$ for selective removal of water from a feed stream introduced into the membrane device.

12. A process, comprising:

delivering a feed stream comprising a component to be filtered or separated therefrom into the plurality of feed flow slots of the membrane device of claim **1**, thereby allowing the feed stream to flow across the porous sheet membranes and the component to be transported from the feed stream to a permeate or sweep stream that is subsequently discharged from the permeate or sweep flow slots.

13. The process of claim **12**, wherein delivering the feed stream includes flowing the feed stream through the membrane device in a counter-current flow direction or a cross-current flow direction relative to the permeate or sweep stream.

14. The process of claim **12**, wherein delivering the feed stream includes providing a pressure gradient disposed between a feed side of the membrane device and a permeate side of the membrane device at or above 1 bar to filter and/or separate the component from the feed stream.

15. The process of claim **12**, wherein delivering the feed stream includes delivering the feed stream through the porous metal membranes of the membrane device with a pressure drop of less than 1 bar.

16. The process of claim **12**, wherein porous metal membranes of the membrane cassettes comprise a zeolite membrane supported on a porous metal sheet.

17. The process of claim **12**, wherein delivering the feed stream includes introducing a feed stream comprising algae into the membrane device and releasing a feed stream from the membrane device comprising a greater concentration of algae therein and a permeate stream from the membrane device comprising water.

18. The process of claim **12**, wherein delivering the feed stream comprises introducing a feed stream comprising humid air with a relative humidity of at least about 10% into the membrane device, such that at least 20% of moisture in the feed stream is removed and discharged in a permeate stream.

19. A process for fabrication of the membrane device of claim **1**, comprising:

assembling the first and second membrane cassettes together to form the stack of membrane cassettes, wherein assembling comprises aligning the first plurality of depressions on the first membrane cassette with the second plurality of depressions on the second membrane cassette to form the plurality of feed flow slots.

20. The membrane device of claim **1**, wherein the porous metal membranes comprise an asymmetric porous metal membrane.

21. The membrane device of claim **1**, further comprising porous backing materials in contact with the porous metal membranes, the porous backing materials comprising conjugated channels connectable to the plurality of permeate or sweep flow slots to provide flow paths for a permeate or sweep fluid.

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